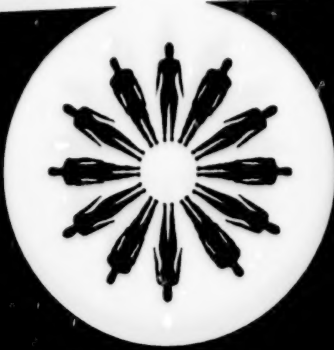


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# National Longitudinal Surveys



U.S. Department of Labor  
Bureau of Labor Statistics

Discussion  
Paper

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The National Longitudinal Surveys (NLS) program supports many studies designed to increase understanding of the labor market and methods of data collection. The *Discussion Papers* series incorporates some of the research coming out of the program. Many of the papers in this series have been delivered as final reports commissioned as part of an extramural grant program, under which grants are awarded through a competitive process. The series is intended to circulate the findings to interested readers within and outside the Bureau of Labor Statistics.

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# NLS Discussion Papers

## **The Determinants and Consequences of Public-Sector and Private-Sector Training**

James J. Heckman  
Stephen V. Cameron  
Peter Z. Schochet

November 1992

Report: NLS 92-15

## **The Determinants of Public-Sector and Private-Sector Training**

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Stephen V. Cameron of University of Chicago, and  
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November 1992

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**FINAL REPORT TO THE**

**U.S. DEPARTMENT OF LABOR  
Grant Number E-9-J-9-0048**

**THE DETERMINANTS AND CONSEQUENCES OF  
PUBLIC SECTOR AND PRIVATE SECTOR TRAINING**

**James J. Heckman, Principal Investigator  
in cooperation with Stephen V. Cameron  
and Peter Z. Schochet**

**National Bureau of Economic Research,  
University of Chicago and Yale University**

**This project was funded by the U.S. Department of Labor, Bureau of Labor Statistics under Grant Number E-9-J-9-0048. Opinions stated in this document do not necessarily represent the official position or policy of the U.S. Department of Labor.**

## Executive Summary

In a series of empirical research papers based on the National Longitudinal Survey of Youth (NLSY), we have investigated the determinants and consequences of various forms of post-secondary education and training. The goal of this research is to broaden the analysis of post-secondary education to consider a variety of non-academic training options that are widely used but rarely studied. These options are especially important for the study of minority schooling and workforce attachment patterns. All of our analyses are done for male youth.

A variety of forms of non-traditional education are considered: public job training, military training, business and proprietary schooling, community college education, on the job training (formal instruction from employers) and apprenticeship programs. Rather than analyzing these choices in isolation, we consider the choices that individuals make from the full spectrum they confront. Our analysis of choices considers these options as well as the options of working without formal training, serving in the military without training, not working at all, and more traditional educational choices. We also consider participation in "second chance" activities such as Adult Basic Education and General Equivalence Degree programs.

This study has both substantive and methodological components. New econometric methods are used to explore dynamic models of choices among discrete options at various stages of the life cycle. These methods enable us to extend traditional piecemeal estimation methods that consider one choice at a time in isolation from other choices to a fully dynamic setting. Such an extension turns out to be essential in producing behaviorally interpretable models of schooling and training choices that recognize the selective nature of post-secondary training and schooling for minority youth. To consider transitions in isolation from each other is to ignore the selective nature of schooling and training. Only the most able minority students complete high school and attend college. Standard statistical methods confound the



parameters of behavioral functions with the parameters of distributions that describe the selection process that makes a person eligible for a transition. In our study of the post-secondary choices of minority youth, we find that these considerations are empirically important in estimating models that are interpretable. The tools developed in this project have wide applicability in econometrics and social science more generally.

Many new empirical findings have been produced. The empirical results on job training show that the vast majority of young males invest in one type of training program and that most programs are taken within the first four years after completing secondary school or attaining a GED. The only exception to this rule comes for persons taking company training. Blacks are over-represented in government and military programs and are under-represented in college and off-the-job programs. Blacks and whites are equally likely not to participate in any program, or to participate in government training programs.

Measured family background variables and financial variables affect training choices. We reject traditional models that make simple two-state (e.g. college-no college) distinctions in favor of multistate models that recognize a diversity of choices. We find that once we disaggregate schooling and training choices, we produce empirical models that more closely account for differences in minority schooling and training behavior than do traditional models that ignore the spectrum of choices confronting youth. In models that account for self-selection into schooling, we find evidence that income effects and credit market limitations play strong roles in explaining schooling and training choices.

The returns to most forms of private training activity are positive. The same cannot be said of most public training activity. The longer one spends in most private activities, the greater the size of the economic reward. An econometric curiosity that emerged from our work is that estimates of the economic returns to one training activity are not affected by exclusion or inclusion of other forms of training activity in an earnings equation. This finding appears to vindicate the piecemeal approach to estimating economic returns that studies one form of training in isolation of another. This result only holds for

earnings equations and not for equations for the choice of method of training. In estimating the returns to various forms of training, there appears to be little problem with self-selection. Corrections for endogeneity or self-selection only raise standard errors and do not affect point estimates.

Our estimates reveal that six months of off-the-job training or training in the military is equivalent to between one and two years of college education. Individuals who invest in such types of training are predicted to earn roughly 35 cents more per hour (1986 dollars) than those who do not and they work about 2.5 more weeks than non-investors. A major limitation of these estimates is their short-run character. The NLSY only follows youth for a short portion of their life cycles.

In the course of our investigation of job training and lifecycle schooling choices, we began an extensive investigation of a neglected social phenomenon: the recent rapid growth in the fraction of persons who achieve high school certification by means of an equivalency examination rather than through the traditional route of high school graduation. In 1968, only five percent of all new high school students were awarded high school certificates through exam certification. By 1987, the corresponding figure was in excess of fourteen percent. Eleven percent of all persons who completed their education with a high school degree obtained it with the GED. (GED is short for General Educational Development). It is widely believed that the GED is equivalent to the traditional high school degree and the U.S. Census equates the two forms of high school certification. Many training programs adopt the GED as an educational end in itself, especially Adult Basic Education programs.

Our analyses of the NLSY data challenge the conventional wisdom. Exam-certified high school graduates do no better in the labor market than high school dropouts with the same number of years of classroom training. There is little evidence of any direct economic benefit to exam certification. However, GED recipients are more likely to qualify for post-secondary training benefits than do dropouts. The modest economic benefit that arises from exam certification is solely a consequence of additional training activity. GED recipients do less well in these training programs than ordinary high school graduates. Our



study finds little evidence of any social return to GED test-taking. The private return to GED certification arises from its role in satisfying bureaucratically-determined requirements for post-secondary training and schooling programs.

A major conclusion of this study is the limited value of exam measurements for predicting labor market outcomes. While tests are widely used to evaluate schooling and training, there is no evidence that the tests predict success in the labor market. A companion study of the GED finds little evidence that the determinants of GED test-taking are related to the quality of the high school attended or to job market opportunities. GED test-taking does not appear to be a response to standard incentives discussed in the traditional schooling literature. GED test-taking explains the apparent puzzle of a post-1970 decline in high school graduates as a proportion of 17-year olds and a near constancy in the proportion of persons in the age range 20-24 with at least a high school certificate.

Although GED test-taking apparently is not explained by the same factors explaining high school graduation we find that school continuation decisions are critically affected by family background and local labor market variables. The better the opportunities for unskilled labor, the lower are high school continuation rates. School quality does not affect dropping-out behavior once parental background and local labor market opportunities are controlled for. Disaggregating post-high school choices into the full array of academic and non-academic schooling produces more sensible models of post-secondary schooling choices for minority youth (i.e. models that can be interpreted in a coherent behavioral framework).

In a more disaggregated model, we find that black, white and hispanic schooling choices are sensitive to tuition costs, the generosity of labor-market opportunities which constitute alternatives to schooling, and to family background and schooling. We find evidence of forward-looking behavior. High school dropout rates rise when college tuition costs rise. Although disaggregated models with better

income and tuition variables produce behaviorally more interpretable models for all race/ethnic groups, they do not account for either time series or cross-sectional differences among these groups.

## **Paper Summaries**

- (1) Alternatives to College Education: Incidence and Returns For Young Males**  
by Peter Z. Schochet
- (2) The Nonequivalence of High School Equivalents**  
by Stephen V. Cameron and James J. Heckman
- (3) Educational and Training Transitions: Determinants of Youth Schooling  
and Training Transitions**  
Stephen V. Cameron and James J. Heckman
- (4) Dynamics of Educational Attainment For Blacks, Whites and Hispanics**  
Stephen V. Cameron and James J. Heckman
- (5) Trends in College Entry Among Whites, Blacks and Hispanics: An Economic  
and Econometric Perspective**  
Stephen V. Cameron and James J. Heckman

## INTRODUCTION

The five papers summarized in this report use the NLSY to broaden and deepen our understanding of the determinants and consequences of schooling and training choices of late adolescents and young adults. These papers extend previous studies of college attendance and completion by considering the determinants of schooling choices made at each age after age 13. The studies reviewed below extend the traditional approach by considering a broad array of nonacademic educational options that are often selected by youth—especially minorities. This report also considers the economic return to the variety of traditional and nontraditional training and educational activities selected by youth.

We find that the traditional approach to the economics of educational choices is, in several respects, quite misleading. First, in papers (2), (3) and (4), we note that youth confront a variety of schooling and training options. An alternative to high school graduation is GED certification. We document that such certification has grown in importance over time. One in every seven new high school certified persons is a GED recipient. GED recipients earn no more than high school dropouts with the same number of years of formal schooling. Neither military nor civilian employers value an exam-certified high school degree on par with a traditional high school degree. The determinants of GED certification are different from the determinants of ordinary high school achievement. The educational consequences of the two types of degree are also different: many fewer GED recipients go on to college and those who do finish both two year and four year colleges at a lower rate than traditional graduates. The main economic incentive for obtaining a GED is that it entitles recipients to federal financial support programs for post-secondary education. However GED recipients complete such programs at a much lower rate than traditional graduates.

Second, the traditional approach to the economics of education does not consider the dynamics of educational choice. Either completed years of schooling are studied or one grade transition in isolation

from other transitions is examined. Both approaches are quite misleading and are challenged in papers (3), (4) and (5). For minorities, it is especially important to control for self-selection in completing high school for determining who goes on to college. Failure to account for educational selectivity results in the now standard finding that economic incentives do not explain college attendance. Just the opposite is found when controls for selection are made. In a general dynamic model of schooling choices, local labor market opportunities, family income, college subsidies and family background all account for the life cycle dynamics of schooling choices. However, these factors do not account for much of the difference in the levels and timing of differences in school attendance by race and ethnicity. See especially paper (4).

Third, most of the previous literature that estimates gross returns to schooling, vocational training and other forms of training looks at one activity in isolation from other training and educational activities. Using the NLSY, in paper (1) we estimate the returns from all activities in a common framework. We find strong returns to most forms of training and education. Somewhat surprisingly and reassuringly we find that traditional approaches that ignore other programs in estimating gross returns for a particular program appear to produce valid estimates of those returns.

(1) Alternatives to College Education: Incidence and  
Returns for Young Males

by Peter Z. Schochet

This study explores the incidence and short-run returns to alternative types of formal human capital investment programs for young men. The motivation for this study rests on the observation that less than half of young adults attend college programs, and the figure is substantially less for blacks and hispanics. It is thus of great interest to determine the training activities of youths who do not attend college. In most empirical human capital studies it is assumed that individuals who do not attend college only invest in on-the-job skill acquisition. The main reason for this assumption is the absence of information about such training programs. This study, based on data from the random sample of the 1979-1986 National Longitudinal Survey of Youth (NLSY), shows that 52 percent of males between the ages of 21 and 28 reported attendance in formal training programs apart from the training receiving in two- and four-year colleges. Almost one-half of the 60 percent who did not attend college participated in alternative human capital investment programs. Mangum, Mangum, and Hansen (1990) assess the returns to these programs and state, "Considering the massive volume of training ongoing in the U.S. economy and the constant advocacy for more, it may be surprising how little is actually known about the results."<sup>1</sup>

Using an economic model and econometric methods, we study government, vocational and commercial, military, apprenticeship, company training, and two- and four-year college education in a unified choice framework. The term "unified" is highlighted since the bulk of the literature that addresses address human capital training programs treats participation in each program in isolation, while other studies aggregate all program participation within a single "training" variable. Little empirical

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1. Mangum, S., Mangum, G., Hansen, G., 1990, Does it pay? Assessing the returns to training. 1990 IRRA Volume, page 1.



information is known concerning the interactions among an array of training programs--private sector and public sector, including the military training--when studied in the same contextual situation over time. One benefit of adopting a unified choice approach is that we can systematically ascertain whether or not there are observable differences among individuals who chose the different training programs. Another benefit is that we can assess the comparative economic returns of each program by including relevant training variables that have typically been excluded from previous studies. Ours is the first study that achieves this unification.

We adopt an economic model which assumes that individuals choose the program(s) that maximize their net present value of lifetime income streams. Family background, demand condition and ability variables are used as explanatory variables to proxy for the 'costs' of the particular programs. Models that allow for discrete choice (multinomial probit and multinomial logit choice models) are estimated. The estimates are used to correct for and test for potential sample selection and/or endogeneity biases when hourly wage, annual salary, and annual weeks worked regressions are estimated.

Our main findings are summarized in the order that they appear in the text as follows:

1. There is diversity in the program characteristics, although there is often some overlap in the type of training received across the various programs. However, there are enough differences to suggest a possible sorting of the males into the programs based on their socio-economic background and ability variables.
2. The vast majority of males participated in, at most, one form of human capital investment program, and, in most cases, the formal training began by the age of 22 with an exception for those who received company training.
3. The sample means show that blacks are over-represented in government and military programs, and are under-represented in the college and off-the-job programs. However, blacks and whites are equally

likely to participate in none of the training programs. High school dropouts are likely to either take no training, or to participate in government training programs.

4. Measured family background variables have explanatory power in determining the training choices of the individuals in the sample. Both the variable means and the polychotomous choice model estimates both imply a sorting of the individuals into the training program categories based on their observable variables. Individuals from more advantaged backgrounds are more likely to choose investment paths that involve greater resources than are individuals from less advantaged backgrounds.

5. The socioeconomic background variables seem to be predictors of the ability measure used in the analysis of the Armed Forces Quotient Test (AFQT) scores. The result casts doubt as to what the variable truly represents. It is not certain whether the AFQT scores are a cause or consequence of schooling. Results are thus presented with and without the AFQT measure as a control variable. The results pertaining to the models that exclude the scores are 'purer' and more reliable.

6. The parameter estimates in the multinomial choice models that include the AFQT measure as an explanatory variable are significantly different than those obtained when the AFQT measure is excluded from the independent set. In particular, the family background parameter estimates and t-values are larger when the AFQT variable is excluded from the analysis.

7. In the polychotomous choice models, blacks are significantly more likely than whites to have enrolled in college programs than any other programs when the AFQT scores are entered into the explanatory set. However, blacks are most likely to have participated in government and military programs when the AFQT variable is excluded from the analysis.

8. We statistically reject the traditional college/no college choice framework in favor of a more diversified choice structure. In fact, we reject any aggregation of the six to eight training states that are employed

in the analysis. The result suggests that there are statistically significant differences in the determinants of various training choices.

9. The multinomial probit and the multinomial logit estimates are qualitatively similar, and the goodness-of-fit measures suggest that the two models perform equally well.

10. The multinomial probit results suggest the presence of some significant correlations among the normalized unobservables in the training choice equations, and the direction of the effects generally fit prior expectations. The estimated variance-covariance matrices are very similar whether or not the AFQT variable is included as a control variable.

11. If funding for the government programs had been curtailed, we find that the government trainees would have more likely received no formal training than to have invested in any of the other training programs. The situation would cause a private economic loss to these trainees since we estimate small but positive returns to the government programs. We find that if the military continues to be less accessible to individuals due to its increasingly stringent entrance requirements, then the demand for vocational programs would likely increase. These results are obtained by estimating multinomial logit models for the subsample of males who did not participate in the studied training category, and by using the resulting estimates to predict the likely choices of the members of the respective omitted group.

12. There is little evidence of structural change by age in the training choice equations reflecting the increasing returns to education in the period when our sample members were at risk. We do not reject any aggregation by race. The result is probably due to the small number of blacks and hispanics in the sample.

13. It is the length of time that an individual spent in a training program that yields positive returns as opposed to program participation per se. There is also evidence that vocational and company training

programs yield positive returns only if the programs were completed, and that there are no additional premiums attached to government programs that last for more than nine months. A week spent training in any of the studied programs generally yields returns that are at least as large as a week spent in the labor force.

14. The inclusion of the AFQT variable significantly changes the estimates of the returns to education (grades completed), but it does not significantly change the coefficient estimates for the training dummy or weeks spent in training variables. Thus, the AFQT variable seems to be correlated with academic programs, but is uncorrelated with the programs that have technical and vocational emphases.

15. The training variables are essentially orthogonal to one another. The exclusion of any of the training variables does not significantly change the estimates of the included ones. The result suggests that estimates from previous human capital studies that exclude any of the training program variables are not seriously biased.

16. There is very little evidence of the endogeneity of the training variables. The result holds true for all the control and instrumental variable methods that are used, and the result also holds true whether the AFQT variable is included or excluded from the analysis. The main effect of using the sample-selection techniques is that the training dummy variables all become insignificant.

17. Six months of off-the-job, government, or military training is equivalent to between one and two years of college education. Individuals who invested in programs for that length of time are predicted in 1986 to have earned about 35 cents more per hour, about 1,500 dollars more per year, and to have worked 2.5 more weeks per year than did those who chose to invest in none of the training programs. These estimates, however, represent short-run returns (about seven-year returns) and say nothing concerning the long-run effects of the training programs.



18. Blacks who participated in any of the training programs earned comparable hourly wages and salaries, and worked similar number of weeks as did whites who did not enroll in any of the training programs. Both groups are predicted to have earned about 7.25 dollars per hour, 12,400 dollars per year, and to have worked about 43.3 weeks in 1986. However, the same pattern does not emerge when high school dropouts are compared with high school graduates while holding race constant. In 1986, dropouts who invested in any of the programs are predicted to have earned about 10 cents less per hour, about 800 dollars less per year, and to have worked about 2 fewer weeks per year than did nondropouts who invested in none of the training programs.

From a policy perspective, an important finding is that those who participated in *any* of the training programs generally received higher hourly wages and annual salaries, and worked a greater number of weeks than did those who participated in none of the training programs. However, the positive rewards from the programs only accrued to those who participated in the programs for a substantial amount of time and/or to those who completed their programs. We find that males from poorer households were more likely to have specialized in programs that required less resources to attend than were those from more advantaged backgrounds, suggesting that financing constraints played a major role in determining the training program choices of the individuals. There is also no evidence of comparative advantage based on unobservables among the trainees. Thus, non-collegiate training programs can be productive alternatives to more expensive college programs for those with access to limited resources (at least in the short-run). The particular program chosen is not so important. Rather, it is the fact that participants chose to invest at all in a program for a significant amount of time. A major drawback with this study, is that it contains very little information concerning the manner in which individuals financed their investment choices. Thus, our estimates of the effect of family background variables on the human capital investment choices of the males in our sample may be biased upwards if the amount of financial aid received by an individual is inversely related to his family income.

Consequently, it is difficult to perform simulations in order to measure the effects of changes in government policies on individuals' training program participation decisions and to perform cost-benefit analyses. We cannot determine the change in the demand for the various programs due to changes in government policies that alter the supply of funds available to the individuals.

The finding that the training program variables are close to orthogonal in the earnings regressions has practical significance from a policy perspective. The result suggests that it is possible to accurately ascertain the impact of a given training program while ignoring the effects of other training programs. The procedure yields estimates that do not suffer from omitted variable bias due to the exclusion of other human capital investment variables. Consequently, the use of nonexperimental methods in determining program premiums can focus on one training program at a time.



## (2) The Nonequivalence of High School Equivalents

Stephen V. Cameron and James J. Heckman

University of Chicago

December, 1990; Revised, March, 1991 and June, 1991

Revised May 1992

This paper examines the causes and consequences of a neglected social phenomenon - the recent rapid growth in the fraction of persons who achieve high school certification by means of an equivalency exam rather than through the traditional route of high school graduation. In 1968, only five percent of all new high school certificates were awarded through equivalency exams. By 1987, the corresponding figure was in excess of fourteen percent. In 1968, only two percent of all persons who completed their education with high school degrees were exam-certified. In 1987, the corresponding figure was almost eleven percent. It is widely believed that exam-certified high school equivalents are the equals of traditional high school graduates in all relevant behavioral dimensions.

This paper challenges the conventional wisdom. Exam-certified high school equivalents are not identical to traditional high school graduates in terms of their ability as measured by a standard psychometric test (the Armed Forces Qualifying Test), in terms of their wages and hours of work or in terms of their post-certification education and training decisions. Exam-certified high school equivalents are psychometrically inferior to traditional high school graduates. Elsewhere we establish that the determinants of high school certification by exam are very different from the determinants of traditional high school graduation. We demonstrate here that the economic consequences of the two avenues of high school certification are quite different. Exam-certified persons are indistinguishable in many relevant labor market dimensions from high school dropouts who are uncertified. Differences in wages among high school graduates, exam-certified equivalents and dropouts are accounted for by years of schooling attained. There is little evidence of value added from exam certification beyond the effect of years of

schooling completed on wages. However, exam-certified graduates are more likely to take vocational and technical training while traditional high school graduates are more likely to attend academic four-year colleges and complete academic programs when they begin them. Exam-certified high-school graduates are more likely to participate in some form of post-secondary training than are non-exam-certified high-school dropouts. Exam-certified persons who take post-secondary schooling and training earn lower wages than high school graduates undertaking the same activity. The return to high school equivalency certification, such as it is, comes from the return to post-secondary training. Accordingly, it is not appropriate to consider the GED as an educational end in itself - the emphasis in many contemporary state and federal programs.

In light of our evidence, the growing use of GED certification suggests the possibility of widespread misperception on the part of test takers. We establish in this paper that the growth in the level and proportion of exam-certified high school credentials is a direct consequence of federal and state human resource policies that make GED test-taking privately rational even if it is socially unproductive. Since the mid-1960s, both federal and state governments have increasingly subsidized adult basic education programs which have placed a growing emphasis on adult equivalency as a clearly identified and desirable objective. In addition, a high school degree or an exam-certified-equivalent is required for participation in a host of post-secondary vocational and academic financial support programs increasingly subsidized by federal and state governments over this period. The demand for participation in these subsidized programs induced a derived demand for high school certification on the part of high school dropouts.

One major conclusion of this paper is that the GED is a vehicle for participation in post-secondary education due to its value in satisfying bureaucratically-determined qualifications for admission and financial support. Subsidization of these programs by governments reconciles the apparent conflict between low economic returns to obtaining the GED and the large and growing demand for GEDs.

A second major conclusion concerns the limited value of psychometric measurements for predicting labor market outcomes. Our evidence about the labor market inadequacy of exam-certified graduates calls into question the value of psychometric evidence on the efficacy of private schools. (See Coleman, Hoffer and Kilgore 1982 and Chubb and Moe, 1990 who rely on such evidence). Tests like the GED measure skills that are only weakly related to the skills valued by employers.

**(3) Educational and Training Transitions:  
Determinants of Youth Schooling and Training Transitions**

**Stephen V. Cameron and James J. Heckman  
University of Chicago  
December, 1990, Revised March, 1990**

For a sample of young men, ages 13-20 in 1978, taken from the National Longitudinal Survey of Youth (NLSY), we demonstrate that the determinants, economic consequences, and subsequent educational consequences of exam-certified high school certification are fundamentally different from those of ordinary high school graduates. Specifically, we demonstrate three points.

(1) The determinants of high school certification by exam are fundamentally different from the determinants of ordinary high school graduation. (2) The economic consequences of the two avenues of high school certification are very different. In terms of wages at ages 25 and 28, exam-certified persons are indistinguishable from high school dropouts who are not certified. (3) In terms of transitions to further education, exam-certified high school graduates are fundamentally different from ordinary high school graduates. The former are more likely to take vocational and technical training; the latter are more likely to attend academic four-year colleges and complete academic programs when they begin them. Exam-certified graduates are much more likely to take some form of training than are non-certified dropouts.

Our paper challenges a steady stream of reports issued by the American Council of Education - the producer of the leading high school certification exam - the GED (for General Educational Development). That organization claims that GED graduates and graduating high school seniors are equivalent in terms of their market skills and in terms of their ability to complete post-secondary educational and training programs. (Malizio and Whitney, 1982). Using Armed Forces Qualifying Test data administered to all NLSY participants, we document that even on psychometric criteria, GED-certified high school graduates are greatly inferior to traditional high school graduates - even for those

graduates who take no further education. More importantly, we document that GED-certified ability is not the ability desired by the market nor is it the ability that predicts completion of post-secondary schooling and training programs.

Enroute to establishing these points, we present new evidence on the determinants and consequences of the early schooling decisions of American white, hispanic, and black males coming of age in the late 1970<sup>s</sup> and mid-1980<sup>s</sup>. We analyze school dropping-out and continuation decisions. We demonstrate how the growth in exam-certified high school graduates explains the apparent puzzle of a post-1970 decline in high school graduates as a proportion of 17-year-olds and a near constancy in the proportion of persons ages 20-24 with at least a high school certificate over the same period.

This paper also examines the role of family background, local labor market opportunities, and school quality on decisions to continue schooling and on wages and hours of work. Unlike more traditional studies that focus on "college" choice, we disaggregate post-high-school educational and training choices to account for the full array of academic and non-academic schooling and training choices available to potential students. This disaggregation turns out to be helpful in producing sensible models of post-secondary schooling choices for minority youth.

We find strong effects of family background on school continuation decisions. We also find that local labor market opportunities play an important role in explaining secondary schooling decisions and high school dropping-out behaviour. The better are opportunities for unskilled labor, the lower are high school continuation rates. We find little evidence that persons drop out of low-quality high schools at a higher rate, once parental background and local labor-market opportunities are accounted for.



**(4) The Dynamics of Educational Attainment For Blacks,  
Whites and Hispanics**

**Stephen V. Cameron and James J. Heckman  
University of Chicago  
September, 1991, Revised, April, 1992**

This paper examines the role of family background, family income, labor market opportunities and college tuition in accounting for differences in educational attainment by age among black, white and hispanic males. This study extends from the previous literature in two important ways.

(1) Previous influential work by Hauser (1991), Kane (1990) and others is based on Current Population Survey (CPS) data. These data suffer from major limitations of special importance to analyses of the role of family background on educational choices. The CPS data report parental family characteristics of persons only if they are living in the parental home, for those attending college, or, for those living in group quarters. Parental background and income information is not available for non-students not living with parents or for students not living in group quarters.

Virtually all of the evidence on the importance of family background and family income on schooling choices is derived from samples of "dependents", i.e., persons living in the parental home or students in college living in group quarters. Using the NLSY (National Longitudinal Survey of Youth) data we demonstrate that, as a consequence of this data generation process, previous studies tend to underestimate the contribution of family income and financial resources to schooling decisions.

(2) The NLSY data contain richer background information than do the CPS data. We demonstrate the value of access to such information in accounting for schooling decisions. Exploiting the longitudinal structure of the NLSY data, we model educational choices as decisions made sequentially at each age. Unlike previous cross-sectional studies that focus attention on explaining years of schooling completed, we consider the determinants of educational choices at each age.

Unlike other studies that analyze one schooling transition in isolation from all others, we consider



all schooling choices from ages 14 to 28. Such accounting turns out to be empirically important in explaining minority/majority differences in college attendance. High school dropout rates are so large for minority youth that those who graduate high school and are eligible to attend college are scarcely representative of all minorities. By conditioning on high school graduation status, previous analysts mute the role of economic incentives in explaining college attendance because the same incentives operate in much the same way on high school graduation.

Schooling attainment is the outcome of a series of choices made at each age. By estimating age-specific schooling choice functions, we determine at which ages and for what choices economic and socioeconomic factors play an important role. Final levels of schooling attained are the outcomes of our disaggregated age-specific schooling choice equations.

Using this framework, we reach the following three major conclusions.

*(1) Black, white and hispanic schooling choices are sensitive to tuition costs, the generosity of labor market opportunities which constitute alternatives to schooling, and to family background and income.*

*(2) There is evidence of forward-looking behavior. High school dropout rates rise when college tuition costs rise. This evidence suggests that more explicit structural dynamic models are likely to be empirically fruitful.*

*(3) Despite the importance of economic and socioeconomic variables in accounting for schooling choices, they explain little of the cross-section or time-series differences in schooling attainment rates among white, hispanic and black males.*

(5) Trends in College Entry Among Whites, Blacks  
and Hispanics: An Economic and Econometric Perspective

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In this paper, we question the strength of the evidence supporting the main conclusions set forth by those who use Current Population Survey (CPS) samples. There are many limitations of the October CPS. We examine several of these shortcomings by looking at college enrollment data based on the National Longitudinal Survey of Youth (NLSY). Although these data contain substantially fewer persons than the CPS and cannot be used to estimate aggregate annual enrollment rates reliably, they are longitudinal in nature, contain much more information on family background characteristics, and enable analysts to construct measures of family resources for all persons - not just those who are "dependents" as classified by the CPS. Using these richer data, it is possible to estimate more interpretable models of schooling attendance that do not support many conclusions derived from CPS data.

We also raise an important interpretive problem that plagues this paper and many others in this literature. Following a long tradition, Hauser and others estimate the parameter of one transition equation in a multistate educational process: the transition from high school to college. High school graduation is a selective process. Many more whites graduate from high school than do blacks or hispanics. In the presence of unmeasured ability and motivational variables, CPS estimates of behavioral equations for the transition from high school to college confound the effects of variables in placing a person in the category of being a high school graduate and being eligible for college with the effects of those variables in "causing" persons to go to college. We present evidence indicating the importance of measuring or controlling for such motivational models in explaining the determinants of education transitions and call into question the validity of behavioral models of educational transitions estimated on repeated-cross-section data sets like the CPS.

This evidence, and other evidence, render suspect CPS analyses of racial-ethnic differences in college entry. It is not appropriate to constrain family background effects to equality in accounting for racial/ethnic trends. Such a procedure amounts to implicitly picking one value of background characteristics to compare outcome differences between nonparallel college attendance equations. The benchmark value chosen is only implicitly defined, has no compelling justification, and in fact has a peculiar and unintuitive property. A better method of comparison would be to examine the difference in estimated non-parallel equations at a range of explicitly stated and plausible values. The widely-held intuition that slope - constrained equations pass through the overall sample mean is false.

<u>Number</u>	<u>Author</u>	<u>Title</u>
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02	Norman M. Bradburn Martin R. Frankel Reginald P. Baker Michael R. Pergamit	A Comparision of Computer-Assisted Personal Interviews (CAPI) with Paper-and Pencil Interviews (PAPI) in the National Longitudinal Survey of Youth
03	Saul Schwartz Robert Hutchens George Jakubson	Dynamic Models of the Joint Determination of Labor Supply and Family Structure
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**END**

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